



P.L.A.N.T.

Potomac Living at New Town

2023 Solar Decathlon Design Challenge

Multifamily Division

UNAC

VT VIRGINIA
TECH.



Garrett Krueger



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Holly Dufek



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Juho Lee



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Yuanting Peng



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Serrano**

DESIGN PARTNERS

Kathryn Prigmore, Architect

Stephen Koenig, Architect, Planning Commission

Adam O'Neill, Civil Engineering Consultant

OVIAR Global Resilience Systems

Provectus MEP Consultant



ALEXANDRIA, VA

INFRASTRUCTURE

- Nearby schools, grocery, healthcare

TRANSIT

- Bike / walking paths to DC
- Bikeshare
- Bus routes
- Metro lines

NATURE

- Daingerfield Island
- Potomac River Waterfront

● GROCERY

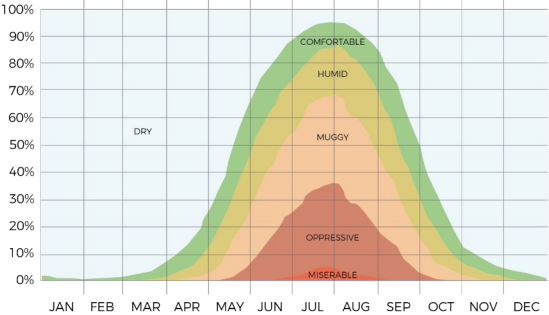
● RESTAURANTS

● PUBLIC GREEN SPACE

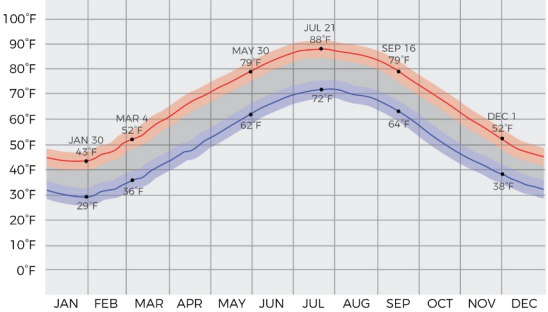
● SCHOOLS

● METRO LINE

● ● ● BUS ROUTES



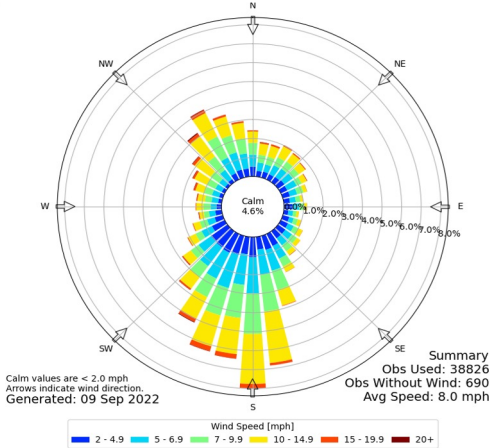
HUMIDITY COMFORT LEVELS
WASHINGTON D.C.



AVG TEMPERATURE | HIGH/ LOW
WASHINGTON D.C.

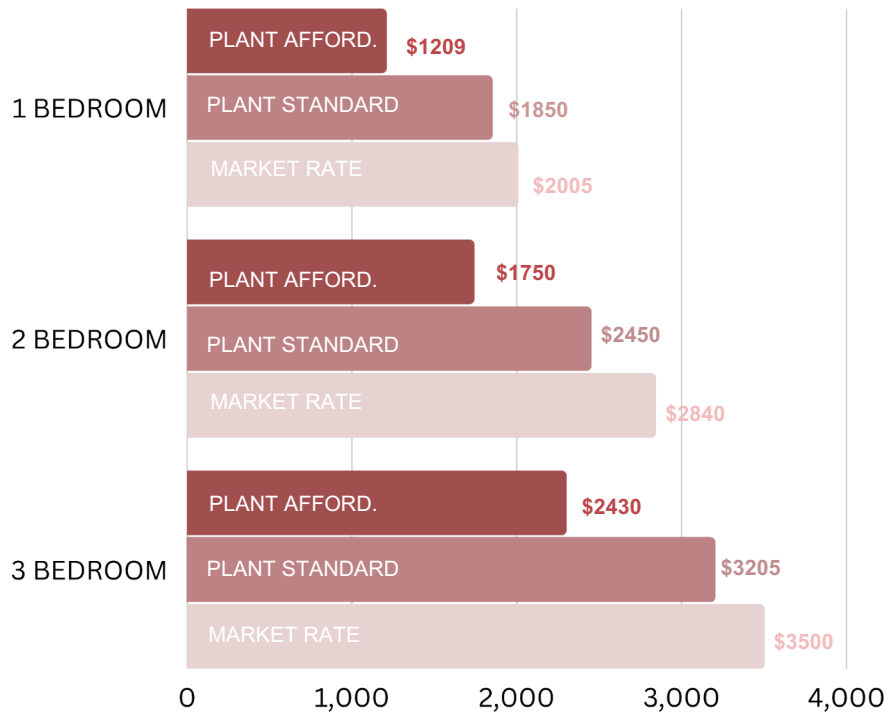


SUNPATH



WINDROSE | SUMMER
WASHINGTON D.C.

UNIT PRICES



AFFORDABILITY

- Power plant provides **low cost energy** to residents
- Clustered design **reduces** unleaseable **corridor space**
- Proximity to **public transit** reduces need for cost of personal vehicle

CONSTRUCTION COST

Building Cost	\$66,256,699
Cost per Unit	\$356,219
Cost per ft ²	\$298.00



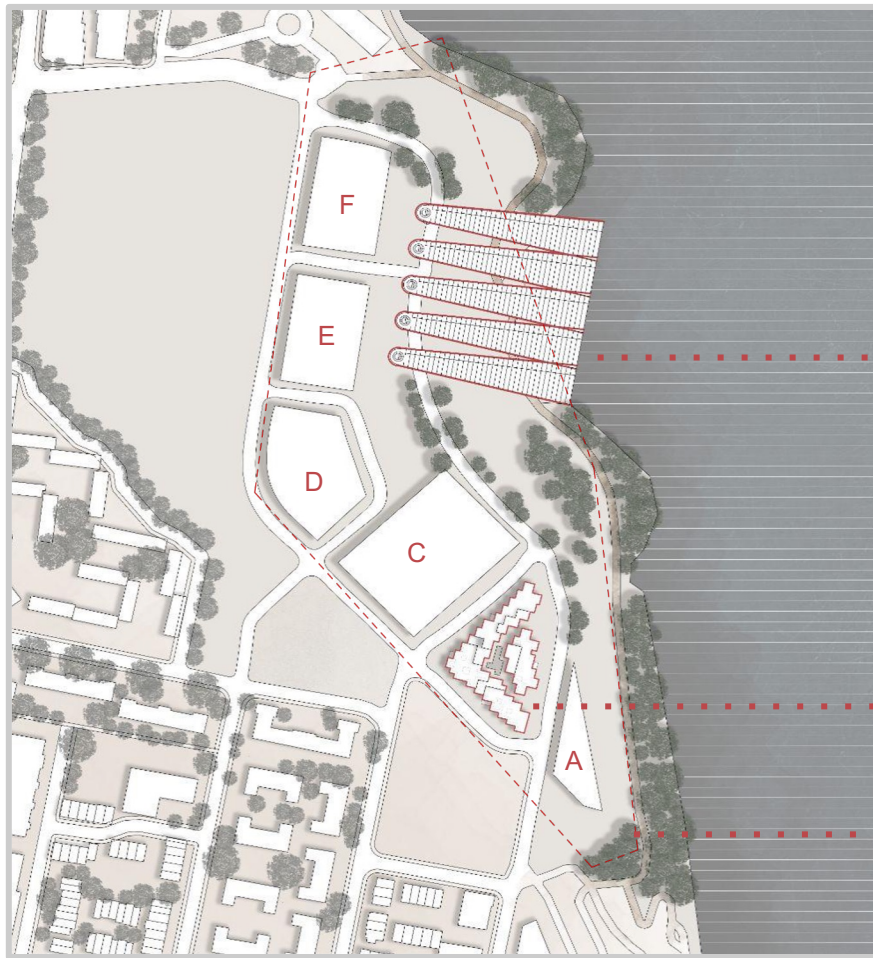
EXISTING COAL PLANT + COAL PILE



EXISTING COAL PLANT + MT VERNON BIKE PATH



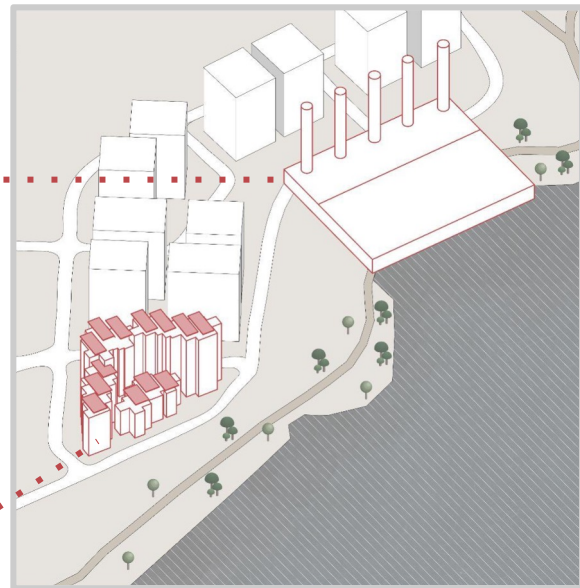
EXISTING COAL PLANT

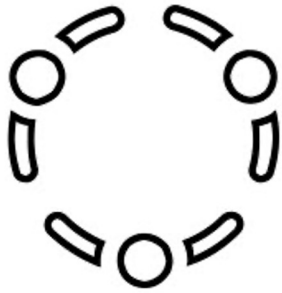


POWER PLANT
PROPOSAL

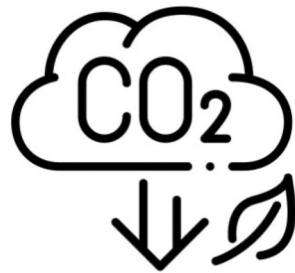
BLOCK B SITE
PROPOSAL

COMPREHENSIVE
SITE BOUNDARY

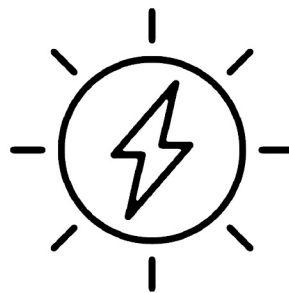




Community Interaction



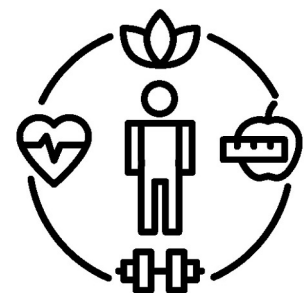
Carbon Conscious
Construction



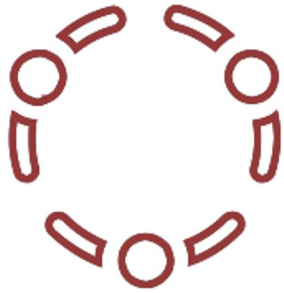
Clean Energy



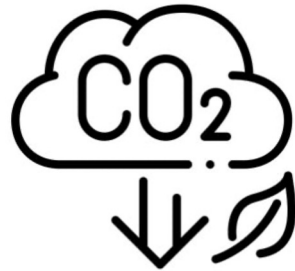
Systems Integration



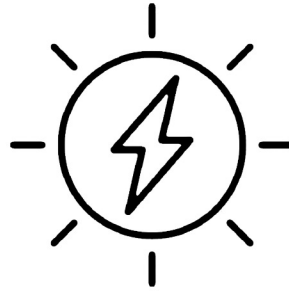
Healthy Living



Community Interaction



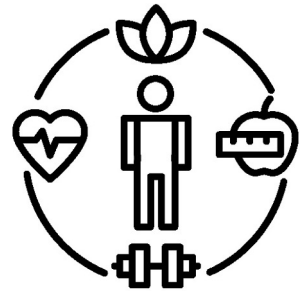
Carbon Conscious
Construction



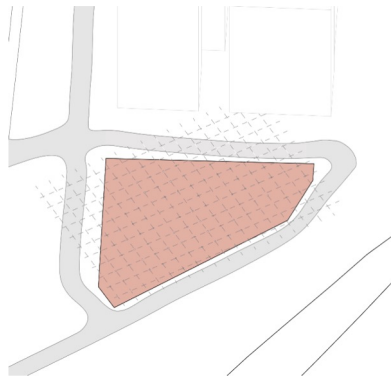
Clean Energy



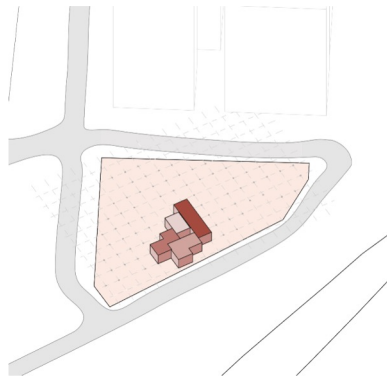
Systems Integration



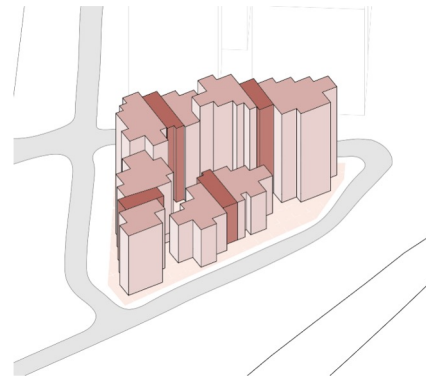
Healthy Living



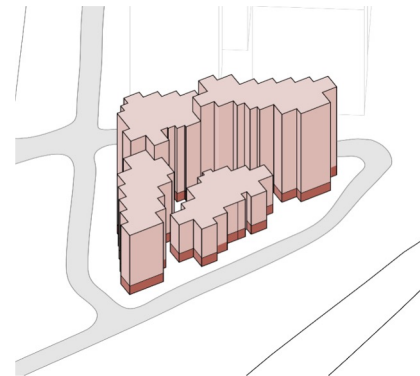
10' X 20' GRID



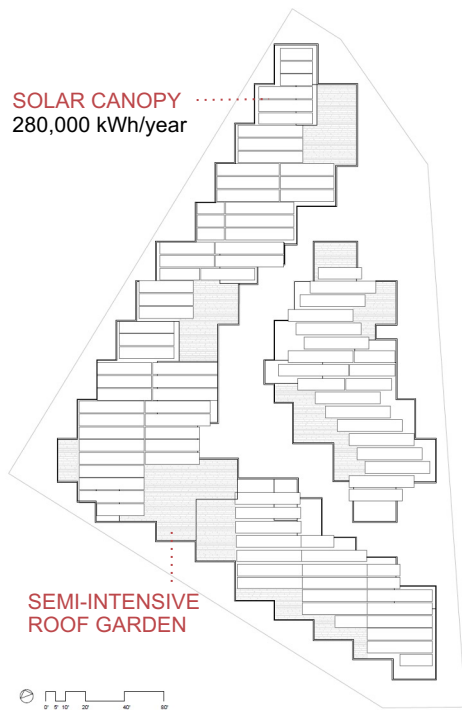
UNIT CLUSTER



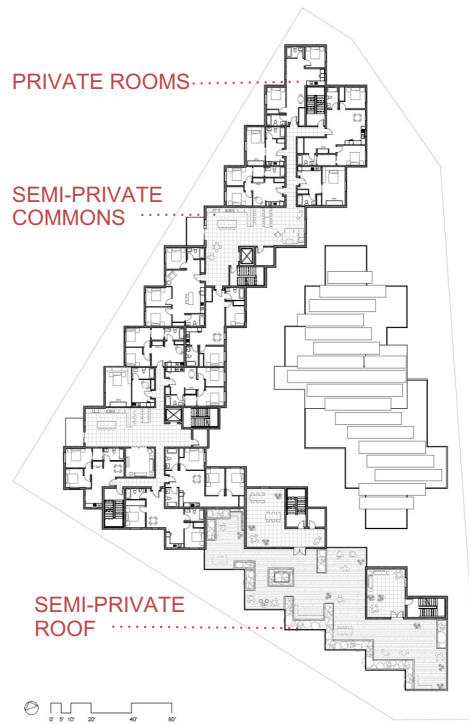
RESIDENTIAL TOWERS



COMMERCIAL BASE



ROOF PLAN | SOLAR CANOPIES



9 | FURNISHED UNITS + ROOFTOP



0 | LOBBY + RETAIL

UNIT LAYOUT LEGEND



49 TOTAL | 16 AFFORDABLE



109 TOTAL | 27 AFFORDABLE



39 TOTAL | 15 AFFORDABLE

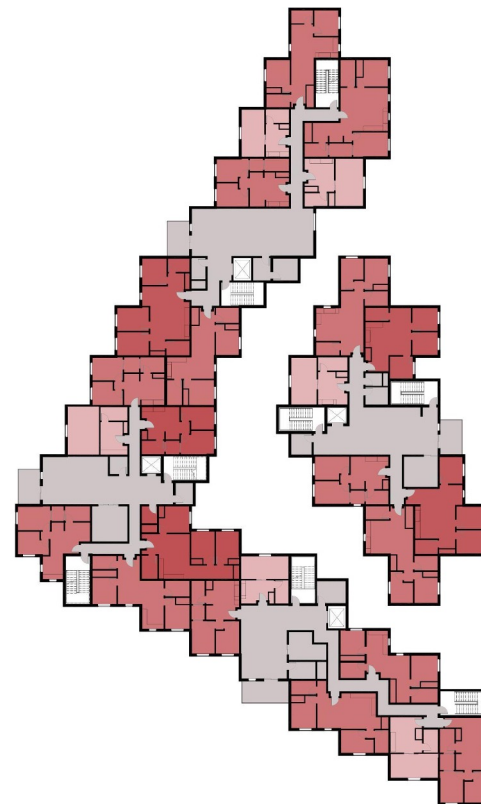


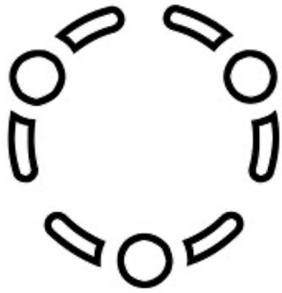
31 COMMON AREAS TOTAL



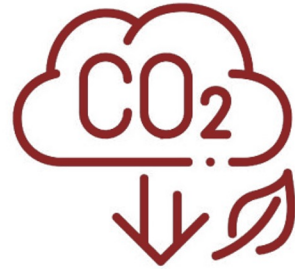
197 TOTAL UNITS | 58 AFFORDABLE

384 TOTAL BEDROOMS | 115 AFFORDABLE

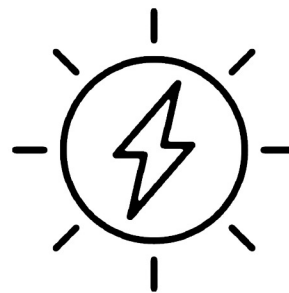




Community Interaction



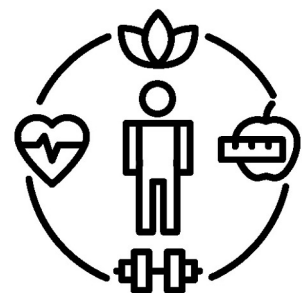
**Carbon Conscious
Construction**



Clean Energy



Systems Integration



Healthy Living



ELEVATION | EAST

CARBON CONSCIOUS CONSTRUCTION



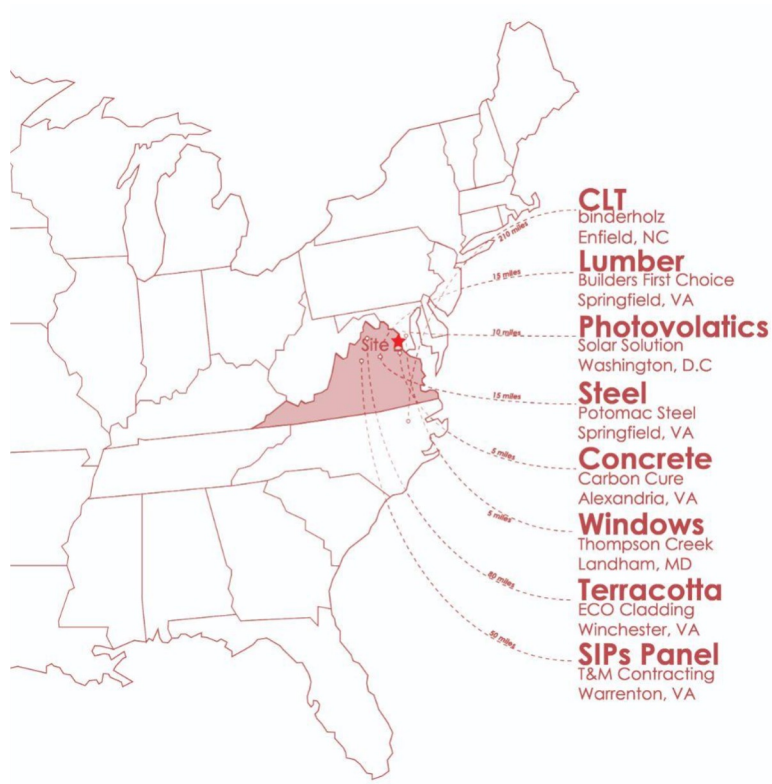




POST-AND-PLATE
MASS TIMBER
LEVELS 2-12

10' X 20' BAY GRID

CARBONCURE LOW CARBON
CAST-IN-PLACE CONCRETE
LEVELS -2-(+1)



GLOBAL WARMING POTENTIAL

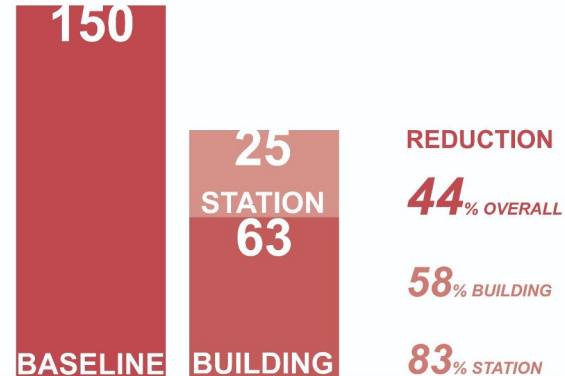
7850 t CO₂e OVERALL

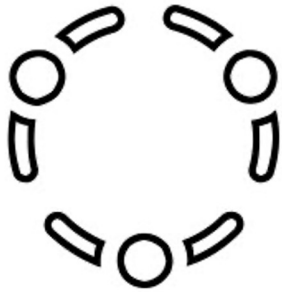
6350 t CO₂e BUILDING

1500 t CO₂e STATION

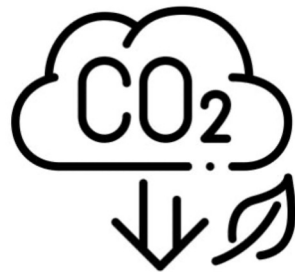
EMBODIED CARBON

(LB CO₂e/ FT²)





Community Interaction



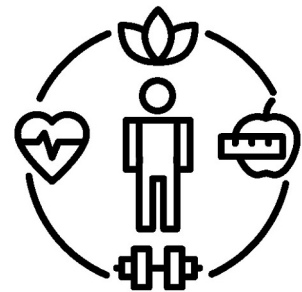
Carbon Conscious
Construction



Clean Energy



Systems Integration



Healthy Living



NORTH

*



SOUTHEAST



EAST



STACKS
to remain

*

*IMAGE FROM HILCO REDEVELOPMENT PARTNERS

**MARSH
REMEDATION**

**SOLAR UPDRAFT
EXISTING STACKS**

**SOLAR FIELD
GREENHOUSE**

**MT VERNON TRAIL
EXTENSION**



SOLAR UPDRAFT PRODUCTION
50,000 kW/h

SOLAR FIELD PRODUCTION
2.1 GW/year

SOLAR CANOPY PRODUCTION
280,000 kWh/year

2.5 GW/year
OVERALL



SOLAR UPDRAFT
TOWER

50,000 kW/h

WIND TURBINE

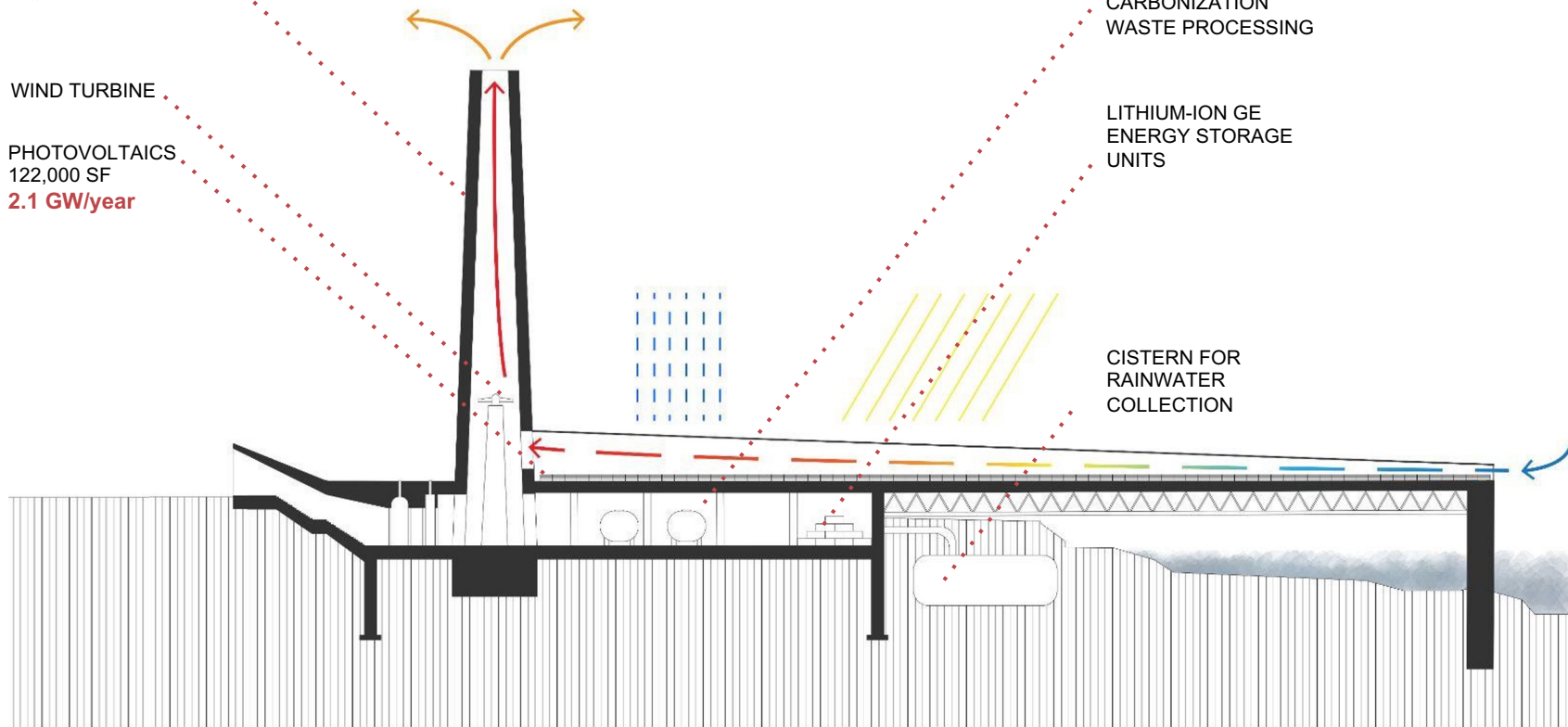
PHOTOVOLTAICS
122,000 SF

2.1 GW/year

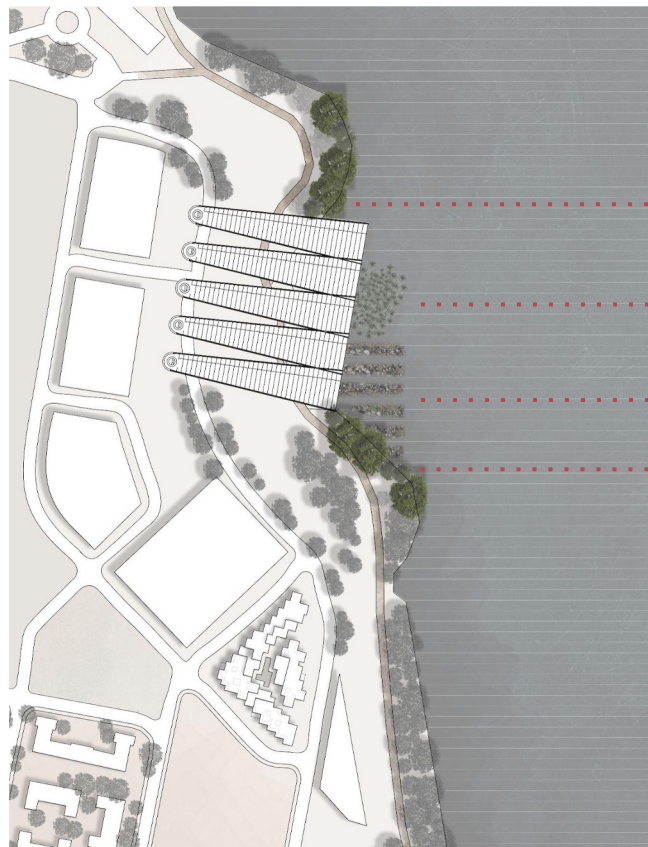
HYDROTHERMAL
CARBONIZATION
WASTE PROCESSING

LITHIUM-ION GE
ENERGY STORAGE
UNITS

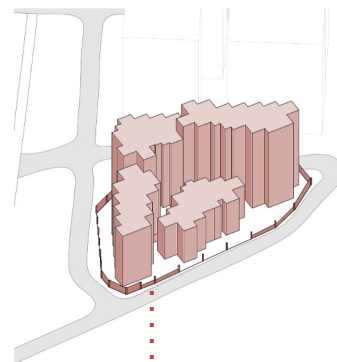
CISTERN FOR
RAINWATER
COLLECTION



MARSH



- Sycamore
- Cattails + Marsh Grass
- Freshwater Mussels
- River Birch



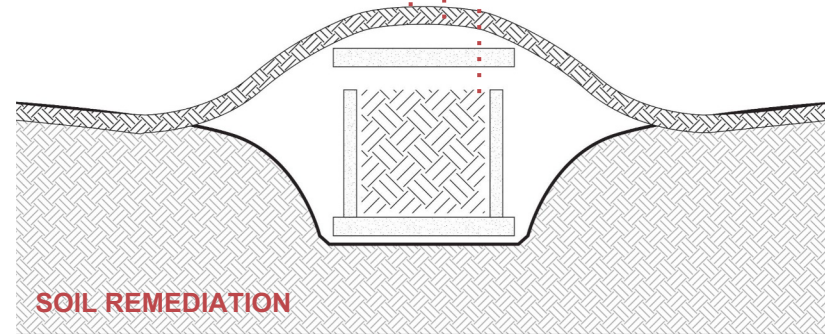
FLOOD WALL

• BIOREMEDIATION

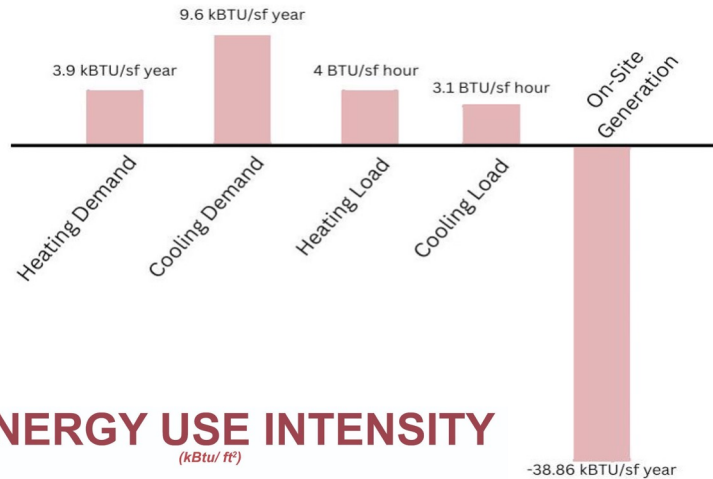
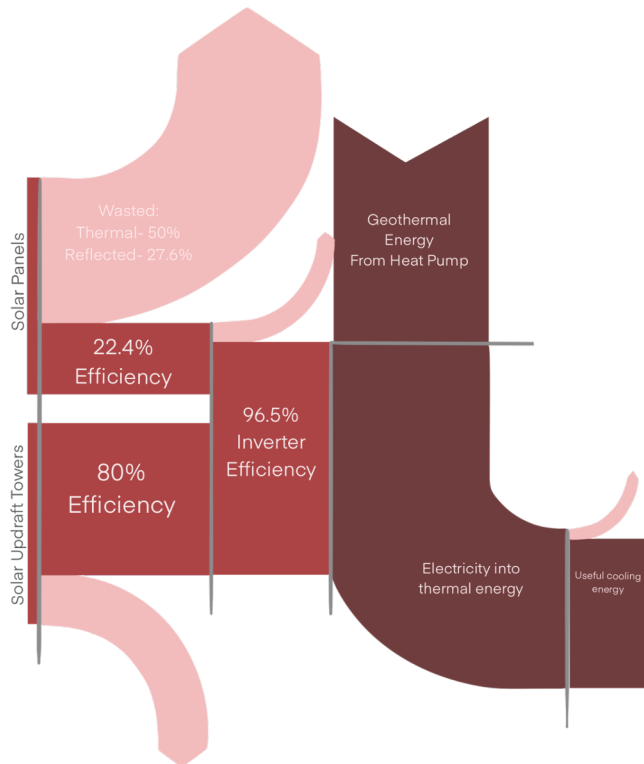
• LOWER POLLUTION SOIL

• HIGHER POLLUTION SOIL

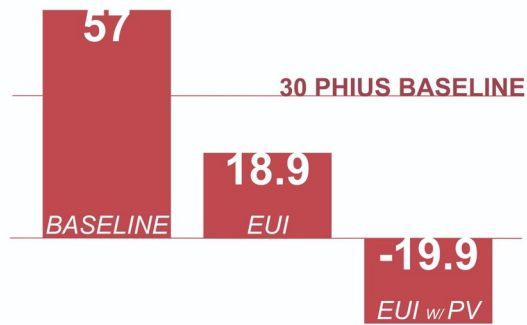
• MAXIMUM POLLUTION SOIL

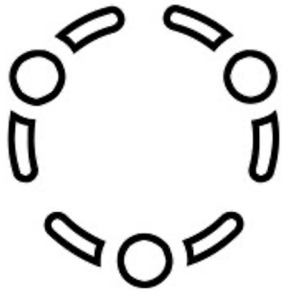


SOIL REMEDIATION

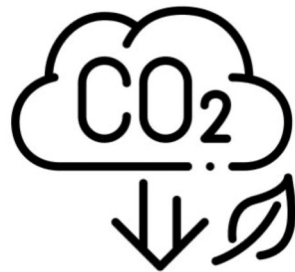


ENERGY USE INTENSITY (kBTU/ ft²)

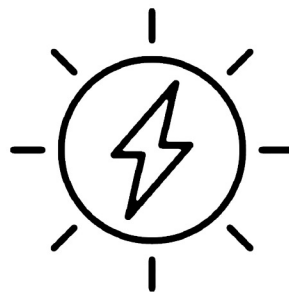




Community Interaction



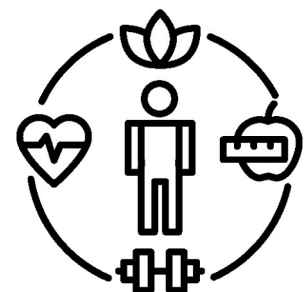
Carbon Conscious
Construction



Clean Energy



Systems Integration

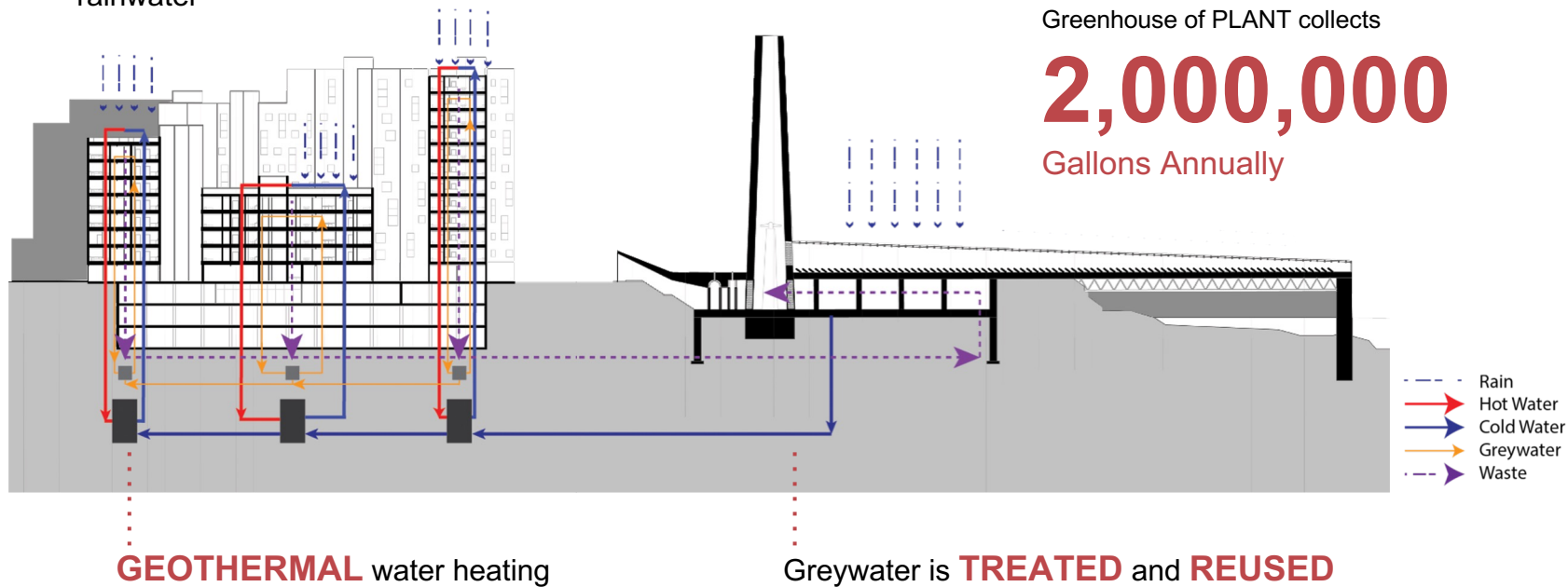


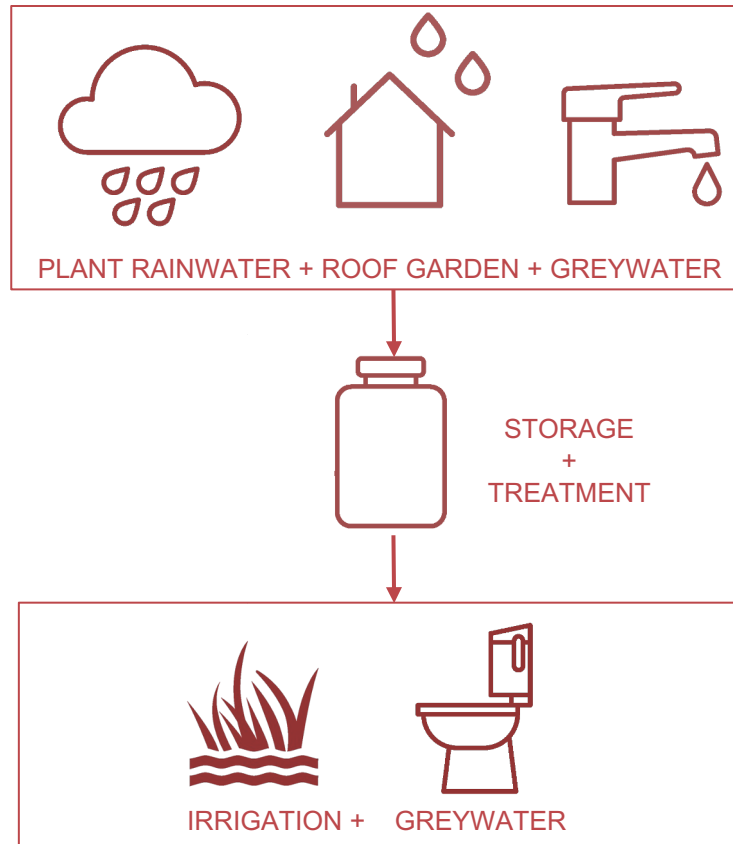
Healthy Living

Semi-intensive green roof
COLLECTS and **FILTERS**
rainwater

Greenhouse of PLANT collects

2,000,000
Gallons Annually





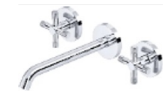
WATER DISTRIBUTION + APPLIANCES



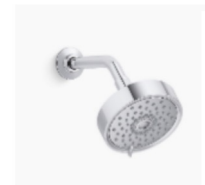
niagra dual-flush,
.5/.95 GPF



kohler soaking
bathtub



rohl bath faucet
1.3 GPM



kohler purist shower
1.75 GPM



kohler rival faucet
1.5 GPM



samsung washer/dryer
avg 93 kWh/yr
avg 3807 gallons/yr



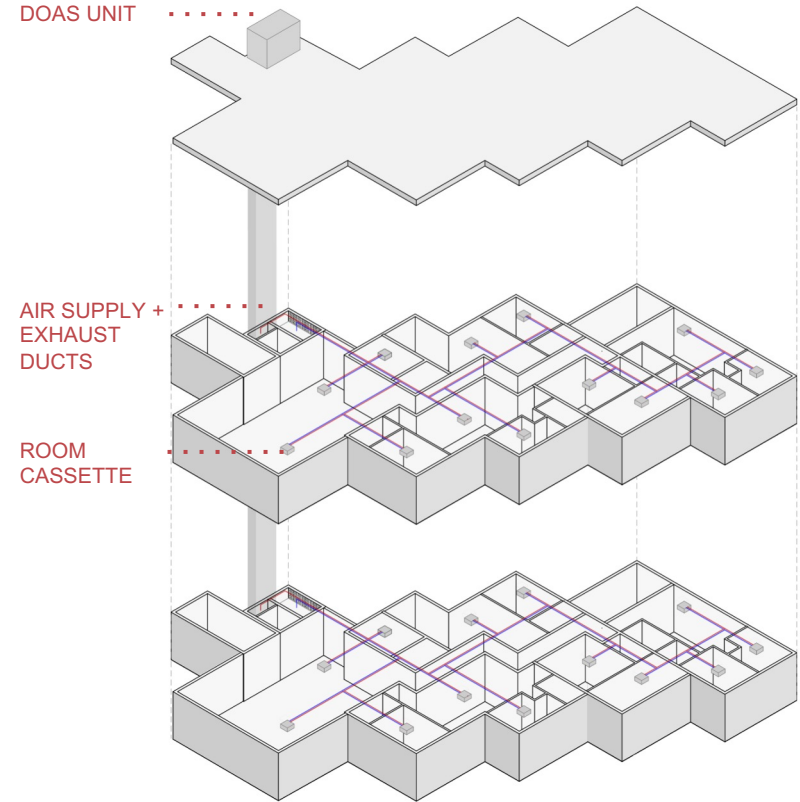
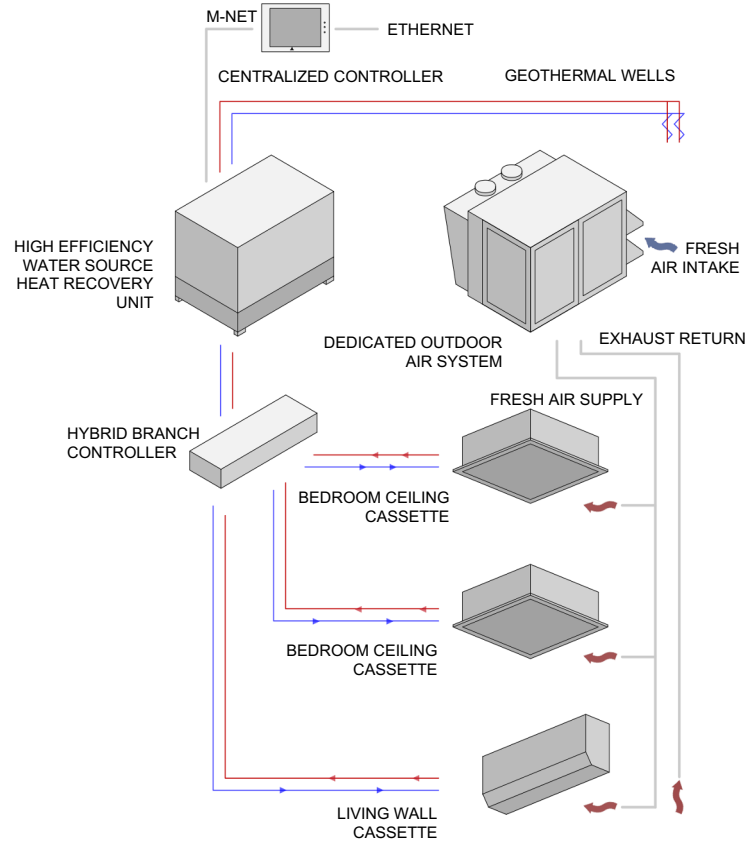
miele dishwasher
199 kWh/yr
3.2 gallons/cycle

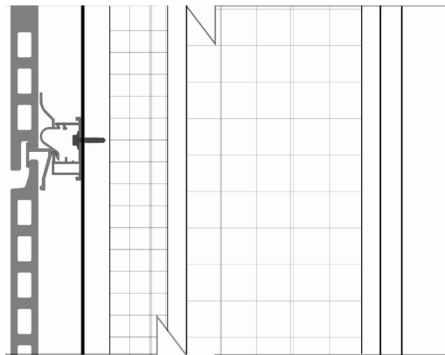


leibherr refrigerator
288 kWh/yr

ENERGY SAVING LOW FLOW APPLIANCES

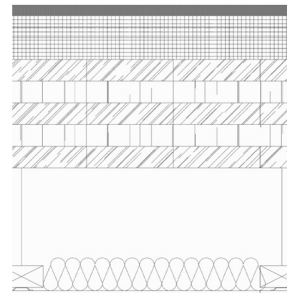






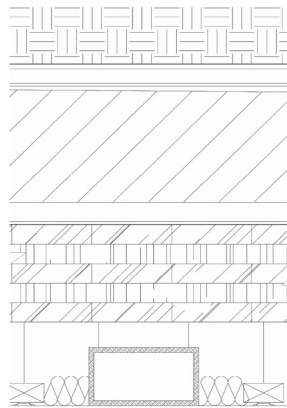
R48 - Exterior Wall

- 2" - Terracotta Cladding
- 4" - Cladding Structure
- 2" - Rigid Insulation
- $\frac{1}{8}$ " - A/V Membrane
- 6 $\frac{1}{2}$ " - SIPS Panels**
- $\frac{5}{8}$ " - Plasterboard Finish



R43 - CLT Floor

- 1" - Wood Finish
- 6" - Rigid Insulation
- $\frac{5}{8}$ " - Quiet Walk Underlayment
- 1' - 5 Ply CLT Floor Panel**
- 9" - Suspended Ceiling System
w/ HVAC, ELECTRICAL +
PLUMBING Systems
- $\frac{5}{8}$ " - Plasterboard Finish

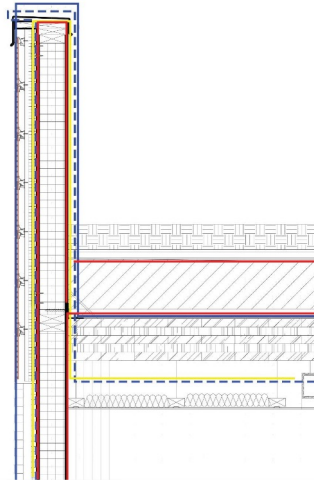


R78 - Semi-Intensive Roof

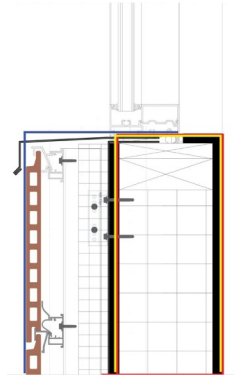
- 2" - Stone Pavers
- 6" - Soil
- $\frac{1}{16}$ " - PolyFelt Filter
- $\frac{1}{2}$ " - Ram Drain
- 1 $\frac{1}{2}$ " - Ram RB
- 1' - Insulation
- 2" - Ram Protection Course
- $\frac{1}{4}$ " - A/V Membrane
- $\frac{1}{4}$ " - Waterproofing
- 1' - 5-Ply CLT Panel**
- 9" - Suspended Ceiling System
- $\frac{5}{8}$ " - Plasterboard



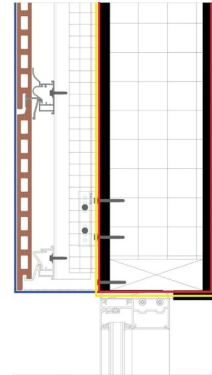
— Thermal
— Water
— Air & Vapor



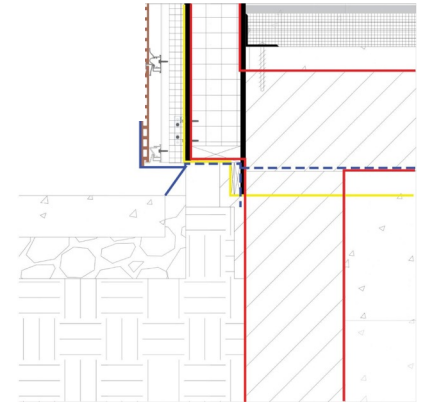
PARAPET CONDITION



SILL CONDITION



HEADER CONDITION



GROUND CONDITION

Solar Canopies

Native Vegetation



Fragrant Sumac



Common Buttonbush



Virginia Creeper Vine



Wild Blue Phlox



Yellow Indian Grass



Coral Bells

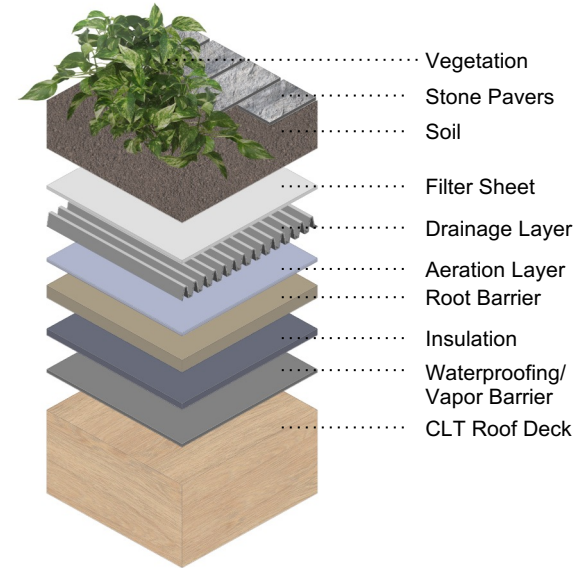


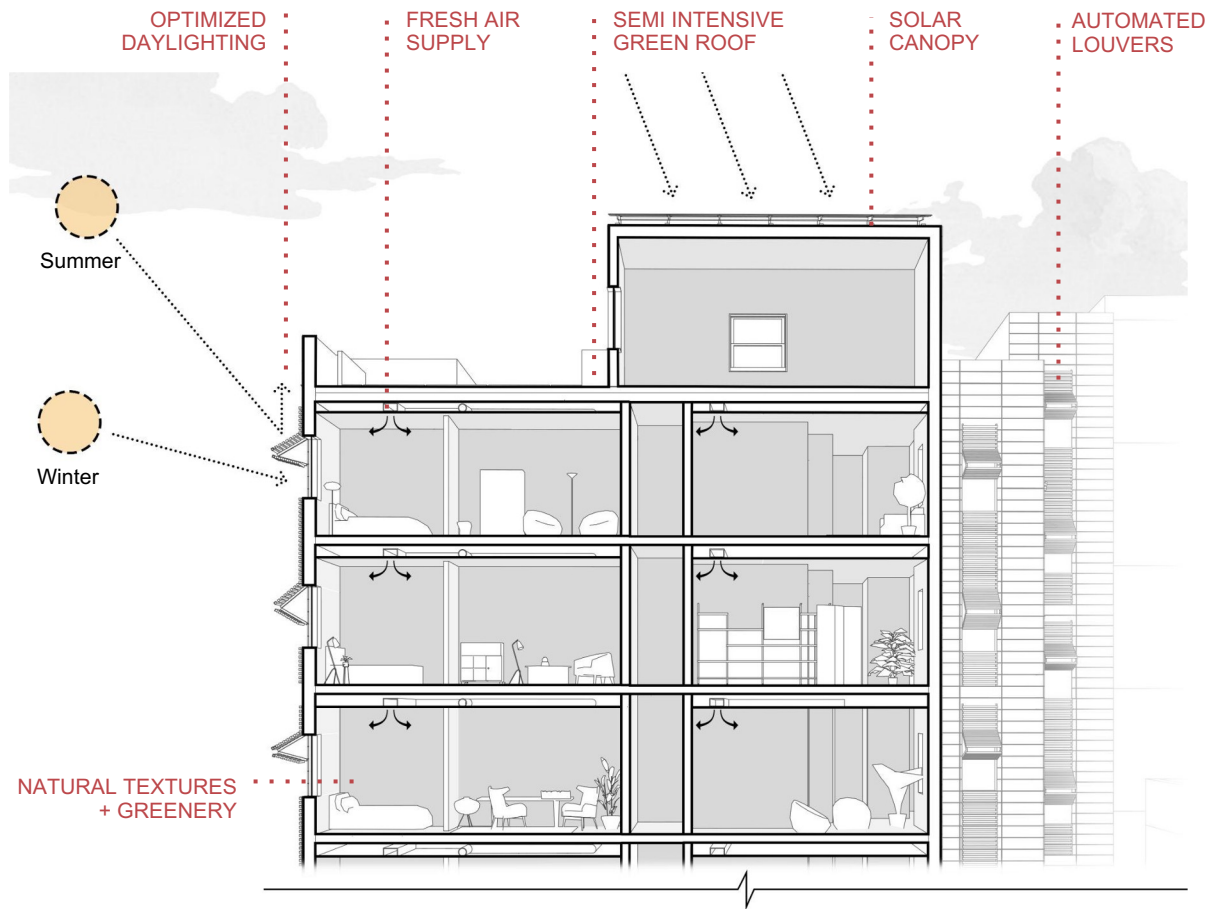
Wild Hydrangea

Semi-Intensive Vegetative Roof

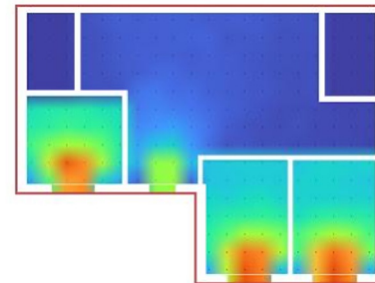
Wall Assembly

- Increased thermal insulation
- Native vegetation/ habitat
- Occupiable garden

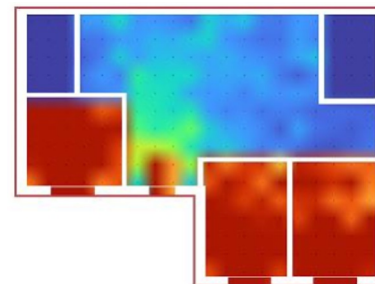


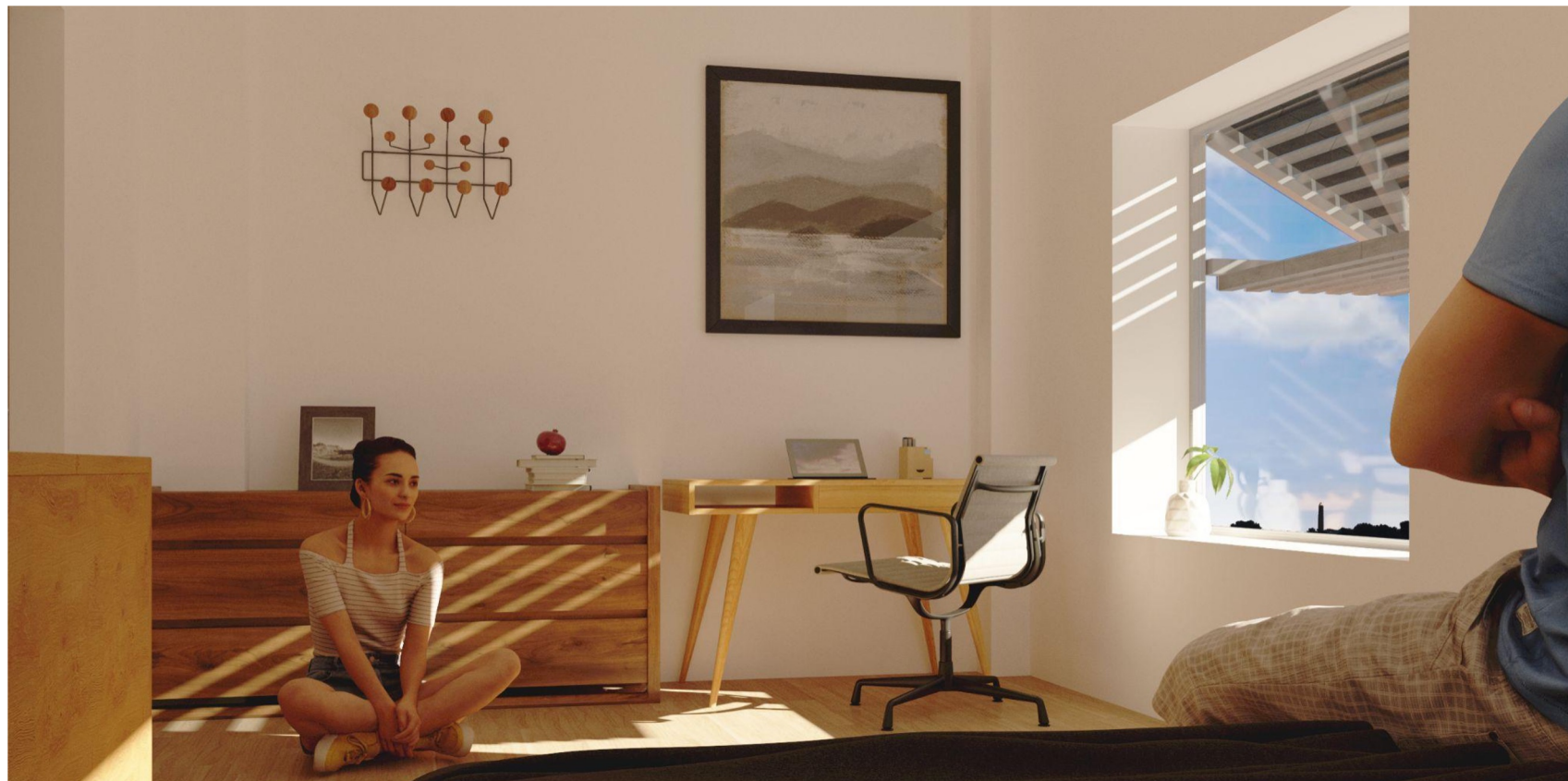


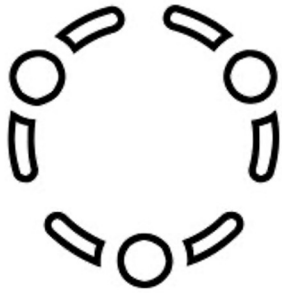
SUMMER DAYLIGHTING | WITH SHADES



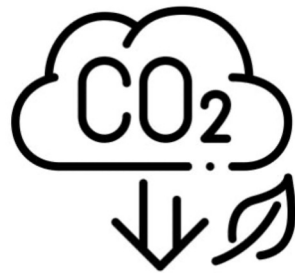
WINTER DAYLIGHTING | WITH SHADES



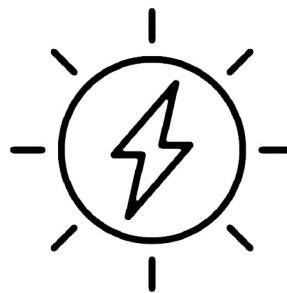




Community Interaction



Carbon Conscious
Construction



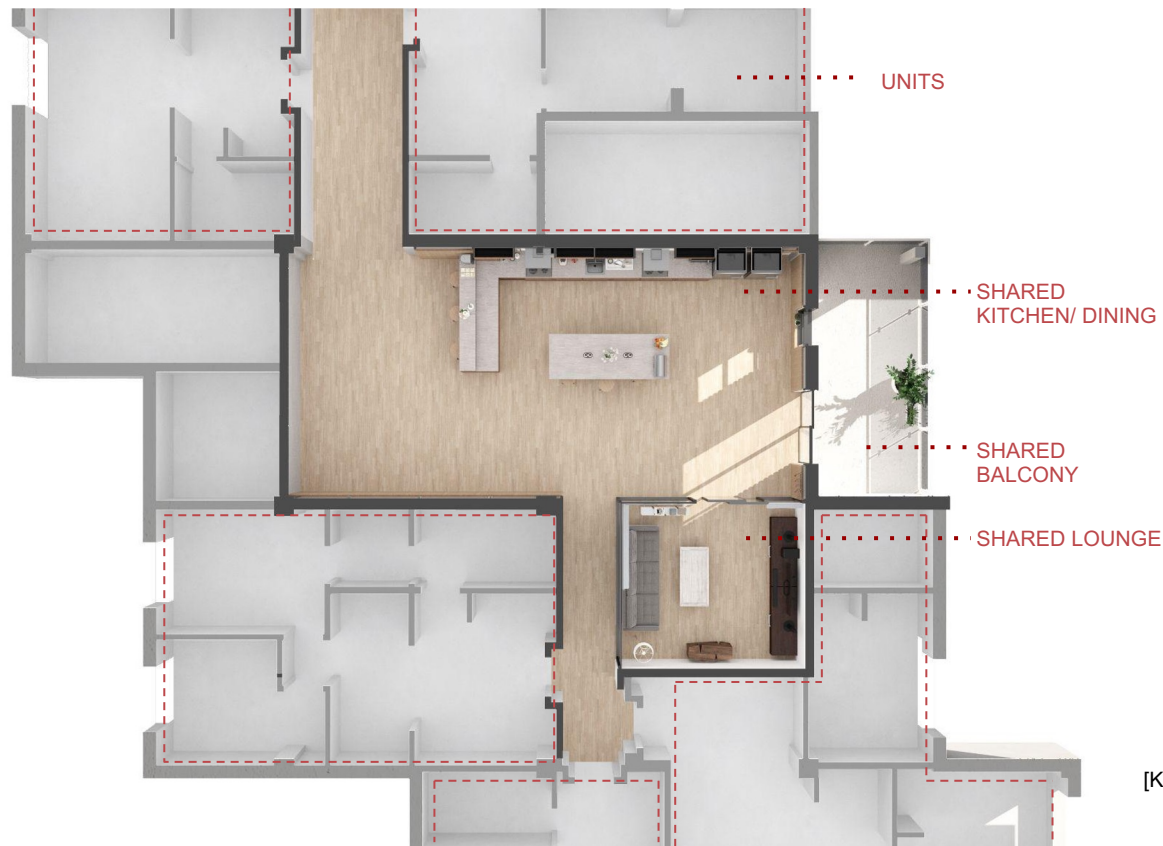
Clean Energy



Systems Integration



Healthy Living



Common Space

[Kitchen, Balcony, Lounge, Laundry, Shaft]

Floor Area: 1400ft²





1 Bedroom x 1 Bathroom

Floor Area: 400ft²



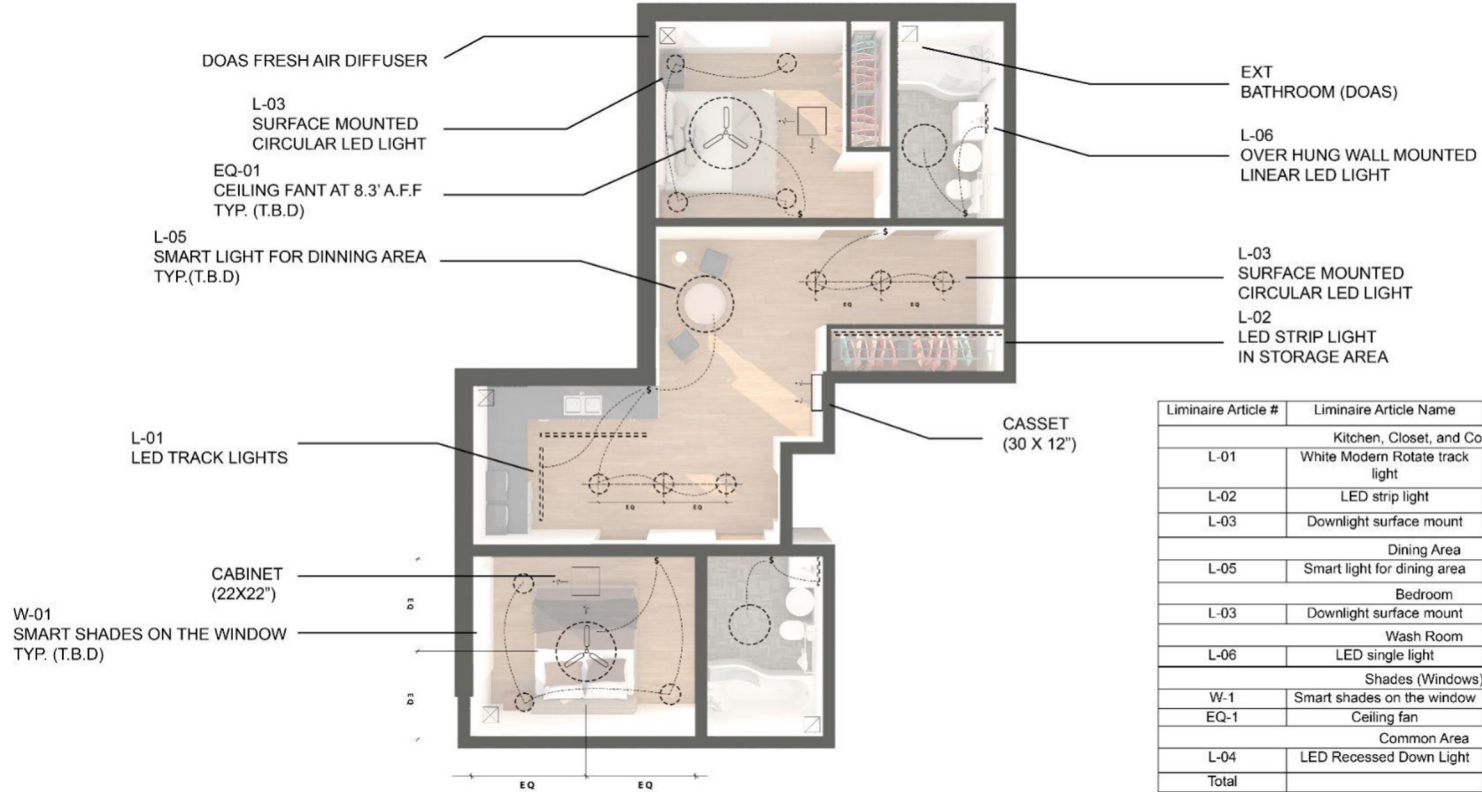
2 Bedrooms x 2 Bathrooms

Floor Area: 800ft²



3 Bedrooms x 2 Bathrooms

Floor Area: 1000ft²



Liminaire Article #	Liminaire Article Name	P(W)	O(lm) total
Kitchen, Closet, and Corridor			
L-01	White Modern Rotate track light	112	1,820
L-02	LED strip light	1541	198,789
L-03	Downlight surface mount	480	28,800
Dining Area			
L-05	Smart light for dining area	123	46,647
Bedroom			
L-03	Downlight surface mount	112	1,900
Wash Room			
L-06	LED single light	36	1,956
Shades (Windows)			
W-1	Smart shades on the window	110	
EQ-1	Ceiling fan	140	10,500
Common Area			
L-04	LED Recessed Down Light	360	30,000
Total		3,040	



Individual Comfort

- Lighting
- Shades
- Temperature
- Fans
- Wifi



corelite discreet



sylvania LED

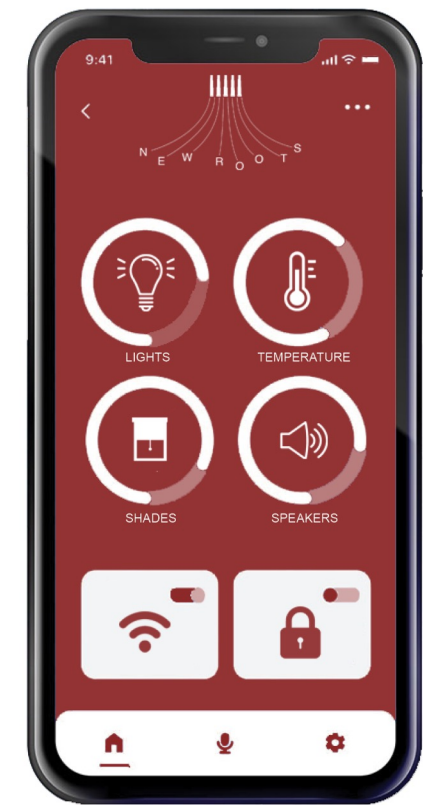
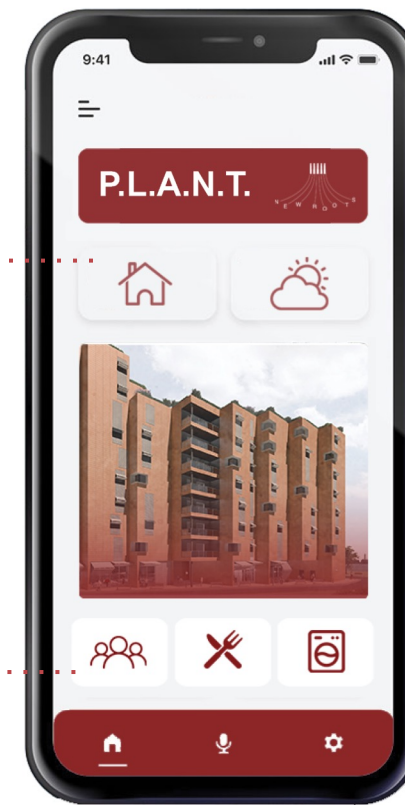


motion/ daylight sensor



Community Involvement

- Building and cluster events
- Local events and weather
- Rideshare requests
- Cafe ordering
- Laundry availability
- Community needs: pet-sitting, childcare, food share







.514 GW/year



2.5 GW/year

5XS MORE ENERGY

P.L.A.N.T. - POTOMAC LIVING AT NEW TOWN

